CLAIMS

1. An electro-optical system capable of being embarked aboard ground-moving or flying units, for determining the optical flow generated by obstacles in relative motion with respect to the mobile unit, characterised in that it comprises radiation emitter means (5), receiver means (1) for converting the radiation reflected by objects into electrical signals and means (8) for processing the signals generated by said receiver means (1), in which said receiver means (1) comprise at least a vision sensor with receiver matrix configuration and in which said emitter means (5, 6) conform the radiation beam in such a way that the radiation reflected by objects and collected by the receiver means impacts at least a part of the receiver matrix, and in which said processing means compute the optical flow only on the elements of the receiver matrix that are impacted by the radiation.

2. A system as claimed in claim 1, characterised in that the optical flow is determined within a predetermined distance range.

3. A system as claimed in claim 2, characterised in that the maximum distance of the objects that contribute to the optical flow is determined by the intensity of the radiation emitted by the emitter means (5), by the reflectance of the objects impacted by the radiation and by the sensitivity of the receiver means (1).

4. A system as claimed in claim 1, characterised in that the distribution and the shape of the receivers within the matrix are linked to the shape of the beam of radiation emitted by the emitter means (5).

5. A system as claimed in claim 1, characterised in that it comprises a band-pass optical filter with

narrow band (2), with the transmittance peak centred at the emission peak of the emitter means (5).

6. A system as claimed in claim 1, characterised in that said sensor means (1) comprise a matrix of CCD or CMOS sensors.

7. A system as claimed in claim 1, characterised in that the radiation beam (7) generated by the emitter means (5) is shaped in such a way that the radiation (4) reflected by the objects and focused on the sensor matrix (1) impacts a single array of sensors or a sheaf of adjacent sensor arrays.

8. A system as claimed in claim 1, characterised in that the radiation beam (7) generated by the emitter means (5, 6)) is shaped in such a way that the radiation (4) reflected by the objects and focused on the sensor matrix (1) impacts a set of mutually separate rows.

9. A system as claimed in claim 1, characterised in that the radiation beam (7) generated by said emitter means (5, 6)) is shaped in such a way that the radiation (4) reflected by the objects and focused on the sensor matrix (1) impacts a set of sheaves of rows, where the rows of each sheaf are mutually adjacent and the sheaves are separate from each other.

10. A system as claimed in claim 1, characterised in that the radiation beam (7) generated by said emitter means (5, 6) is shaped in such a way that the radiation (4) reflected by the objects and focused on the sensor matrix (1) impacts a single column or a sheaf of adjacent columns.

11. A system as claimed in claim 1, characterised in that the radiation beam (7) generated by said emitter means (5, 6) is shaped in such a way that the radiation (4) reflected by the objects and focused on

the sensor matrix (1) impacts a plurality of mutually separate columns.

12. A system as claimed in claim 1, characterised in that the radiation beam (7) generated by said emitter means (5, 6)) is shaped in such a way that the radiation (4) reflected by the objects and focused on the sensor matrix (1) impacts a set of sheaves of columns, where the columns of each sheaf are mutually adjacent and the sheaves are separate from each other.

13. A system as claimed in claim 1, characterised in that the radiation beam (7) generated by said emitter means (5, 6) is shaped in such a way that the radiation (4) reflected by the objects and focused on the sensor matrix (1) impacts a single line or a set of mutually parallel lines, parallel to the main direction of motion (10).

14. A system as claimed in claim 1, characterised in that the radiation beam (7) generated by said emitter means (5, 6)) is shaped in such a way that the radiation (4) reflected by the objects and focused on the sensor matrix (1) impacts a set of canted lines, each parallel to one of the main directions of motion.

15. A system as claimed in claim 1, characterised in that the radiation beam (7) generated by said emitter means (5, 6) is shaped in such a way that the radiation (4) reflected by the objects and focused on the sensor matrix (1) impacts a set of sheaves of lines, where the lines of each sheaf are parallel to each other and parallel to one of the components of the motion, whilst the beams are not parallel to each other.

16. A system as claimed in claim 15, characterised in that the different sheaves of lines are generated by as many distinct radiation sources.

17. A system as claimed in claim 16, characterised in that the radiation sources for the different sheaves have a different peak wavelength.

18. A system as claimed in claim 17, characterised in that the different sheaves of lines with the different wavelengths are collected by distinct receivers.

19. An autonomous navigation device comprising a plurality of systems according to one or more of the previous claims, each oriented in a different spatial direction, angularly separated from the others, so that the fields of view of the individual electro-optical systems do not overlap.

20. A device for detecting obstacles comprising a plurality of systems according to one or more of the claims 1 through 18, each oriented in a different spatial direction, angularly separated from the others, so that the fields of view of the individual electro-optical systems mutually overlap at least partially.

21. An anti-collision system or an autonomous navigation system for mobile units, characterised in that it comprises and electro-optical system for measuring the optical flow according to one or more of the claims 1 through 18.

22. A system as claimed in claim 21, characterised in that it comprises a "strap-down" inertial navigation device.

23. A system as claimed in claim 22, characterised in that the inertial navigation device comprises three gyroscopes, three accelerometers and/or a magnetometer with three axes used as course indicator and/or a satellite positioning system.

24. An electro-optical according to claim 1, wherein the algorithms for determining the optical flow

are implemented on a processor using VLSI (Very Large Scale Integration) technology.

25. An electro-optical system as claimed in claim 1, characterised in that it comprises an optical device for measuring the distances of obstacles.